Specification

Method for Changing at Least one Printing Plate and a Printing Press Comprising Several Plate Cylinders.

The invention relates to a method for changing at least one printing forme, and to a printing press with several forme cylinders in accordance with the preambles of claim 1 or 6.

A method and an arrangement for the automatic feeding of a printing plate to a plate cylinder, or removal from a plate cylinder, of a rotary printing press is known from DE 39 40 795 A1. The method for the automatic feeding of a printing plate to a plate cylinder of a rotary printing press, wherein the plate cylinder has, inter alia, means for clamping and bracing the printing plate, provides for the printing plate to be placed into a storage chamber of a printing plate feeding or removal device, the plate cylinder is rotated into a plate feeding position, and the printing plate is conducted to a clamping device of the plate cylinder by means of a number of transport rollers. The method for the automatic removal of a printing plate from a plate cylinder of a rotary printing press, wherein the plate cylinder has, inter alia, means for unclamping and releasing the printing plate, is distinguished in that the plate cylinder is rotated forward into a printing plate release position, that a clamping flap for grasping a printing plate end is opened, that the plate cylinder rotates backward, that a clamping flap for grasping a printing plate starting end is opened, and that the printing plate is conducted to a storage chamber of a printing plate feeding or removal device by means of a number of transport rollers. The device for performing the above method has at least one transport roller embodied as a drive roller and one embodied as a pressing roller, wherein the pressing roller can be placed against the drive roller. In addition, various

actuating means, a pivotably seated pressing roller for pressing the printing plate against the plate cylinder, as well as ejection fingers, can be provided, wherein the ejection fingers can have tips which are arranged so they can be pivoted into the periphery of the plate cylinder. Also, the storage chamber of the printing plate feeding or removal device can be seated, pivotable around a joint.

DE 39 40 796 A1 describes an arrangement for automatically changing a printing plate on a plate cylinder of a rotary printing press, wherein the plate cylinder has, inter alia, means for clamping and bracing the printing plate, wherein the printing plate changing arrangement has at least two storage chambers, so that a printing plate released from the plate cylinder can be conducted into a storage chamber by means of transport rollers, while a printing plate stored in the other storage chamber is fed to a clamping device of the plate cylinder by means of transport rollers.

EP 1 084 837 A1 describes a device for holding and conveying a printing forme. Here, this device has translatory conveying arrangements, which convey a printing forme to be mounted on a forme cylinder, or a printing forme to be removed from a forme cylinder. While, for changing a printing forme, the device is tilted around an axis of rotation out of its position of rest into its operating position, a hook is pivoted, merely under its own weight, into the space in which the printing forme is stored and secures the printing forme at its trailing beveled end against inadvertently falling out of this space.

EP 0 734 859 A1 describes an arrangement for changing printing formes, wherein, for changing printing formes, a printing forme loading unit pivots out of a vertical position of rest against a holding element, embodied as a gripper. For

mounting, the holding element grasps a fresh printing forme kept ready in the printing forme loading unit and performs, together with the grasped printing forme, a pivot movement by means of an actuated lift cylinder. In this way the printing forme, which is seated straight in a printing forme supply compartment, is lifted by its front area by the pivoting movement of the holding element, wherein the leading end of the printing forme hangs down. The curved printing forme grasped by the holding element is pivoted by the holding element with its leading end against a forme cylinder in such a way that a suspension leg formed at the leading end of the printing forme can dip into a channel formed in the forme cylinder, which has a proportionally large opening width in comparison to the diameter of the forme cylinder.

A pivotable printing forme changing arrangement is known from DE 199 34 271 A1, wherein a printing forme, which is fixed in place on a printing forme table by a contact body by means of frictional contact, is placed against a printing forme cylinder by a pivoting movement of the printing forme table in such a way that an end of the printing forme projecting past the printing forme table is deformed when an edge formed at the end of the printing forme is placed against the printing forme cylinder, and that the end prestressed in this way snaps into a bracing groove of the printing forme cylinder when the printing forme cylinder is slowly rotated. In the course of this no relative movement takes place between the printing forme resting on the printing table and the contact body.

An arrangement for changing printing formes at rotary printing presses is known from EP 0 678 383 A1, wherein pivotable holding means, which can be charged with a vacuum, pull a leading end of a printing forme to be mounted on a

forme cylinder to the forme cylinder and place this end, which is elastically deformed, against the forme cylinder. In the course of a rotation of the forme cylinder, a beveled edge at the leading end of the printing forme snaps into an opening in the cylinder, wherein the force needed for snapping in of the front edge of the printing forme is supplied by the holding means.

A device for exchanging printing formes at rotary printing presses is known from EP 0 678 382 A1, wherein holding means, which can be charged with a vacuum, place a leading end of a printing forme to be mounted on a forme cylinder against the forme cylinder by exerting a contact pressure, because of which this end is deformed. The contact pressure causes a beveled edge at the leading end of the printing forme, which is prestressed in this manner, to snap into an opening of the cylinder while the latter rotates.

A device for changing printing formes is known from EP 0 734 860 A1, wherein pivotable holding means, which preferably can be charged with a vacuum, place a leading end of a printing forme to be mounted on the forme cylinder against the forme cylinder, because of which this end is elastically deformed.

Devices for changing printing formes are known from both EP 1 155 840 A2 and JP 2000-094 640 AA, wherein a beveled edge at the leading end of a printing forme to be mounted on a forme cylinder, after it has been placed against the forme cylinder, is pressed into an opening in the cylinder by a rolling element. With the device in accordance with EP 1 155 840 A2, the printing forme to be mounted is conveyed out of a magazine by means of a thrusting force acting on the trailing end of this printing forme and is placed against the forme cylinder by making use of the elasticity of the printing

forme. With the device in accordance with JP 2000-094 640 AA, the beveled edge at the leading end of the printing forme to be mounted is placed against the lower half of the forme cylinder and is pushed counter to the force of gravity into the opening of the cylinder.

A method and a device for mounting a flexible printing forme is known from DE 44 47 088 C1, wherein a feed carriage, which can be moved radially and axially in front of the cylinder and has an insertion slider for mounting a suspension leg at the trailing end of the printing forme can be fixed in place in a defined position in relation to the cylinder by means of a preferably conical snap-in bolt, which engages an opening of the cylinder, is radially movable, but otherwise fixed on the frame.

A device for positioning a magazine used for automatic printing plate changing is known from DE 42 24 832 C2, wherein the vertical adjustability of the magazine in the plate changing position is fixed in place by means of a bolt.

A displaceable suspension for a protective printing group device is known from DE 198 03 726 A1, wherein the protective printing group device has displaceable bolts and a device actuating the bolts, wherein, for arresting the protective printing group device in place, the bolts are introduced into lateral frame walls of a printing group.

A printing group for the flying printing plate change at a web-fed offset printing press is known from each of DE 196 03 663 A1 and DE 199 42 619 A1, wherein a contact and release mechanism is provided, by means of which the plate cylinder can be moved away from is assigned rubber blanket cylinder for a plate change.

The object of the invention is based on creating a method for changing at least one printing forme and a printing

press with several forme cylinders.

In accordance with the invention, this object is attained by means of the characteristics of claims 1 or 6.

The advantage to be gained by means of the invention consists in particular in that dressings on a cylinder can be rapidly and dependably changed with the least possible outlay for apparatus while the production by the printing press is running. In one embodiment the change takes place without a pressing element, because of which a particularly simple structural set-up becomes possible. Because the printing formes are placed in a defined position in relation to the printing forme magazine prior to feeding in a printing forme, no means for aligning the printing forme to be mounted are required at the forme cylinder itself. The printing forme is conducted into its desired position for mounting on the forme cylinder by means of a structurally simple carriage, on which the printing forme rests merely because of its weight. The as simple as possible and unhampered mobility of the printing forme magazine to be positioned in front of the forme cylinder is advantageously provided by a connecting element, which combines all required connecting lines in a bundle. All movements required for changing a printing forme, i.e. the progression of the movements of all units involved in this, is possible from a preferably central control device assigned to the printing press, so that an operator does not need to perform any work during the printing forme change at the running printing press.

Exemplary embodiments of the invention are represented in the drawings and will be described in greater detail in what follows.

Shown are in:

Fig. 1, a perspective representation of a dressing,

Fig. 2, a simplified sectional representation of a holding device for a dressing to be mounted on a cylinder,

Fig. 3, dressings which are brought tangentially against the cylinder, on which a radial force acts during their being mounted,

Fig. 4, elastically prestressed dressings in the course of being mounted on a cylinder,

Fig. 5, a 4-cylinder printing press with horizontal paper guidance and with printing forme magazines,

Fig. 6, a printing forme magazine with a conveying device for a used printing forme,

Fig. 7, a printing forme magazine with an inclined lifting device for conveying a fresh printing forme,

Fig. 8, a device in a printing forme magazine for aligning a fresh printing forme in respect to a forme cylinder,

Fig. 9, a printing forme, whose leading end rests on a forme cylinder in the course of being mounted,

Fig. 10, a printing forme magazine with a fresh printing forme, which rests with its print side on a support,

Fig. 11, a printing forme magazine with a conveying device for a used printing forme,

Fig. 12, a partially sectional representation of a printing forme magazine with a friction body placed against a printing forme,

Fig. 13, a friction body guided in a channel, wherein the channel is provided with cutouts.

A dressing 01 (Fig. 1), which is designed as a plate-shaped printing forme 01, or as a support plate supporting a printing blanket, has a substantially rectangular surface of a length L and a width B, wherein the length L can assume, for

example, measured values between 400 mm and 1300 mm, the width B measured values, for example, between 280 mm and 1500 mm. The surface has a support side, called support surface 02 in what follows, with which, in the mounted state, the dressing 01 rests on a surface area 07 of a cylinder 06 (Fig. 2). The back of the support surface 02 is a work surface which, in the case wherein the dressing 01 is embodied as a printing forme 01, is provided with a printing image, or can at least be provided with a printing image. The dressing 01 has two oppositely located ends 03, 04, which delimit the support surface 02, and wherein the suspension legs 13, 14 each preferably extend entirely, or at least partially, over the width of the dressing 01. The support surface 02 of the dressing is flexible at least along the length L and can be matched to the curvature of the cylinder 06 (Fig. 2) when the dressing 01 is being fastened on a surface area 07 of a cylinder 06 of a printing press. In the mounted state of the printing forme, the length L of the support surface 02 thus extends in the direction of the circumference of the cylinder 06, while the width B of the support surface 02 extends in the axial direction of the cylinder 06. In actual use, the measurement of the width B in particular varies within defined predetermined tolerance limits, since the original width B of the dressing 01 is reduced by a trimming of at least one of the longitudinal sides of the dressing 01, for example for adjusting the position of a printing image on the working surface of the dressing 01 to a defined distance measurement in respect to at least one of the long sides of the dressing 01. Here, the tolerance limits lie for example within the range of fractions of a millimeter up to a few millimeters. Thus, the width B of the dressing 01 can differ from other identical dressings 01 used on the same cylinder 06 within the

permissible tolerance limits.

As represented in Fig. 2, the suspension legs 13, 14 of the dressing 01 are fastened by means of a holding device, wherein the holding device is arranged in a channel 08, wherein as a rule the channel 08 extends in the axial direction in relation to the cylinder 06. An end 03 of the dressing 01, which is aligned in the production direction P of the cylinder 06 is called its leading end 03, while the oppositely located end 04 is the trailing end 04 of the dressing 01. At least the ends 03, 04 of the dressing 01 with the suspension legs 13, 14 formed thereon consist of a rigid, for example metallic material, for example of an aluminum alloy. The thickness D of the material of the dressing 01 (Fig. 1), or the thickness D of at least the suspension legs 13, 14, customarily is a few tenth of a millimeter, for example 0.2 mm to 0.4 mm, preferably 0.3 mm. Thus, the dressing 01 as a whole, or at least its ends 03, 04, consist of a dimensionally stable material, so that the ends 03, 04 can be permanently deformed by bending against a material-specific resistance.

A beveled suspension leg 13, 14 each is formed on at least one end 03 of the dressing 01 (Fig. 1), but preferably on both ends 03, 04 along a bent edge 11, 12, wherein the suspension legs 13, 14 can be inserted into a narrow opening 09, in particular embodied in a slit shape, of the channel 08 of the cylinder 06 (Fig. 2), and can be fastened there by means of a holding device. For example, in relation to the length L of the not arched flat support surface 02 of the unmounted dressing 01, a suspension leg 13 at the bending edge 11 at the end 03 of the dressing is beveled at an opening angle $\alpha 1$, or at the end 04 a suspension leg 14 is beveled at an opening angle $\beta 1$ (Fig. 1), wherein the opening angles $\alpha 1$,

β1 as a rule lie between 30° and 140°. If the opening angle α1 is assigned to the leading end 03 of the dressing 01, it is preferably designed as an acute angle, in particular it is 45°. The opening angle β1 at the trailing end 04 of the dressing 01 is often designed to be greater as 80°, or as an obtuse angle, in particular it is between 85° and 135°. The beveled suspension leg 13 at the leading end 03 has a length l13, which for example lies within a range between 4 mm and 30 mm, in particular between 4 mm and 15 mm. The beveled suspension leg 14 at the trailing end 04 has a length l14, which is between 4 mm and 30 mm, for example, in particular between 8 mm and 12 mm, wherein the shorter length is rather preferred in order to assure as simple as possible a removal of the suspension legs 13, 14 from the opening 09 of the channel 08.

Fig. 2 shows in a simplified sectional representation a cylinder 06 with a surface area 07 and a channel 08, which has a narrow, slit-shaped opening 09 of a slit width S toward the surface area 07, wherein the slit width S is less than 5 mm and preferably lies within a range of 1 mm to 3 mm. In the production direction P of the cylinder 06, the opening 09 has a front edge 16 and a rear edge 17. An acute opening angle α2, which lies between 30° and 50°, preferably 45°, is formed between the wall 18 extending from the front edge 16 in the direction toward the channel 08 and an imagined tangential line T1 resting on the opening 09 in the surface area 07 of the cylinder 06. Thus, the beveled suspension leg 13 at the leading end 03 of the dressing 01 can be suspended on this front edge 16 of the opening 09, preferably positively connected, because the opening angle α1 at the leading end 03 of the dressing 01 is preferably matched to the opening angle α2. Conditions are the same at the trailing end 04 of the

dressing 01. Between the wall 19 extending from the rear edge 17 in the direction toward the channel 08 and an imagined tangential line T1 resting on the opening 09 in the surface area 07 of the cylinder 06, an opening angle β2 has been formed, which lies either between 80° and 95°, or preferably 90°, or between 120° and 150°, preferably 135°. Thus, the beveled suspension leg 14 at the trailing end 04 of the dressing 01 can be suspended on this rear edge 17 of the opening 09, preferably positively connected, because the opening angle β1 at the trailing end 04 of the dressing 01 is at least approximately matched to the opening angle β2.

A preferably pivotably seated holding means 21 and a preferably prestressed spring element 22, for example, are arranged in the channel 08, wherein the spring element 22 presses the holding element 21 for example against the beveled suspension leg 14 at the trailing end 04, which is suspended at the rear edge 17 of the opening 09, because of which the suspension leg 14 at the trailing end 04 is maintained at the wall 19 extending from the rear edge 17 in the direction toward the channel 08. For releasing the pressure exerted by the holding means 21, an actuating means 23 is provided in the channel 08 which, when actuated, pivots the holding means 21 against the force of the spring element 22. Thus, the holding device substantially consists of the holding means 21, the spring element 22 and the actuating means 23. Preferably the holding means 21 can be actuated by remote control by means of the actuating means 23.

The cylinder 06 described by way of example can be designed in such a way that several, preferably identical dressings 01 can also be arranged on its surface area 07. If the cylinder 06 is designed as a forme cylinder, it can be covered in its axial direction for example with six side-by-

side arranged plate-shaped printing formes 01. It can also be provided that more than one dressing 01 can be applied to the cylinder 06 in the direction of its circumference. For example, two channels 08 extending axially in respect to the cylinder 06 and having associated openings 09 can be provided, which are arranged, offset by 180° in respect each other, on the circumference of the cylinder 06. With this coverage of the cylinder 06 by two dressings 01 arranged one behind the other along its circumference, the leading end 03 of the one dressing 01 is fastened in the one channel 08, while the trailing end 04 of the same dressing 01 is fastened in the other channel 08. This applies correspondingly to the remaining dressing(s) 01 arranged on this cylinder 06. Also, the dressings 01 arranged side-by-side in the axial direction of the cylinder 06 can be arranged offset in respect to each other, for example individually or in groups, each by one-half the length L of the dressing 01 which, however, requires that further channels 08 with associated openings 09, or at least partial pieces thereof, have been cut into the cylinder 06 and are arranged, for example offset by 90° in respect to the two previously mentioned channels 08 and openings 09, along the circumference of the cylinder 06.

A method for mounting a flexible dressing 01 on a cylinder 06 of a printing press will be described in what follows, wherein the dressing has a leading end 03 and a trailing end 04 in relation to the production direction P of the cylinder 06 (Fig. 3). A suspension leg 13 is formed at least at the leading end 03 of the dressing 01, wherein this suspension leg 13 is beveled at an opening angle $\alpha 1$ of maximally 90°, preferably 45°, in respect to the extended length L of the dressing 01. At least one, preferably slit-shaped opening 09 with a first edge 16 and a second edge 17 in

the production direction P of the cylinder 06 is provided in the cylinder 06, wherein the edges 16, 17 preferably extend parallel with each other in the axial direction of the cylinder 06. The method is distinguished in that the leading end 03 of the dressing 01 is fed, preferably tangentially in its production direction P, to the cylinder 06 preferably by means of a pushing force preferably acting at the trailing end 04 of the dressing 01, and the suspension leg 13 at the leading edge 33 is placed against the cylinder 06 behind the second edge 17 of the opening 09, so that in the course of a rotation of the cylinder 06 in its production direction P the suspension leg 13 formed at the leading edge 03 extends into the opening 09 as a result of a radial force RF acting on the leading end 03 and directed toward the cylinder 06, and is hooked on the first edge 16 by preferably being positively connected there. The pushing force conveying the dressing 01 is advantageously a force acting in the plane of the dressing 01 in the mounting direction M of the latter.

In case the dressing 01 rests with its suspension leg 13 formed on the leading end 03 on the surface area 07 on the cylinder 06, supporting itself thereon, the radial force RF can be the force FG of the weight of the dressing 01 acting on the surface area 07 of the cylinder 06. In this case it is advantageous to conduct the dressing 01 straight over its extended length L, or at least without a bend oriented toward the cylinder 06, to the upper half of the surface area 07 of the cylinder 06 and to place the suspension leg 13 at the leading end 03 on a contact point 27 of the surface area 07 of the cylinder 06 (Fig. 3). As soon as the suspension leg 13 and the opening 09 of the cylinder 06 are located opposite each other because a spacing a09 between the opening 09 and the contact point 27 is canceled, i.e. reduced to zero by

means of a relative movement between the opening 09 and the contact point 27 in the circumferential direction, the suspension leg 13 at the leading end 03 of the dressing 01 falls mostly, i.e. with a proportion of over 70% of the sum of all forces acting on the suspension leg 13, and dependably into the opening 09 of the cylinder 06 because of the force FG of its weight acting on the leading end 03, without requiring a prestressing of the leading end 03 of the dressing 01 which makes use of the elasticity of the dressing 01, or further aids, such as a rolling element.

In addition to the use of the force FG of the weight of the dressing 01, or alternatively to it, the leading end 03 can be simply prestressed (Fig. 04), so that the suspension leg 13 formed at the leading end 03 springs into the opening 09 because of a restoring moment RM directed toward the cylinder 06 as soon as the opening 09 of the cylinder 06 and the contact line 27 of the suspension leg 13 with the surface area 07 of the cylinder 06 are located directly opposite each other because of a relative movement between the dressing 01 and the cylinder 06, which takes place in particular by means of the rotation of the cylinder 06 in the production direction P.

The restoring moment RM results from the fact that the dressing 01 consists of an elastically deformable material and therefore inherently has an elastically resilient property, wherein this property can be utilized because, in the course of bringing the leading end 03 of the dressing 01 to the cylinder 06, it is conducted, for example, over an edge 26 of a support element 24 preferably extending in the axial direction of the cylinder 06 and spaced apart from the cylinder 06, and is bent there in such a way that a bending stress with a spring force directed toward the cylinder 06

(dashed representation of the dressing 01 in Fig. 4) is built up at the leading end 03 of the dressing 01. At least until the leading end 03 of the dressing 01, which is conducted over the edge 26 of the support element 24, rests on the surface area 07 of the cylinder 06, the dressing 01 is fed with its trailing end 04 from a spatial direction which is fixed in respect to the cylinder 06. In this way the dressing 01 is stabilized during the mounting process by the contact line 27 of its suspension leg 13 attached to the leading end 03 with the surface area 07 of the cylinder 06, as well by its support on the edge 26 of the support element 24 and by a positional fixation 28 of the trailing end 04. The support element 24 can be a rolling element 24, for example, which can be placed against the cylinder 06, for example. In this case the support element 24 is preferably arranged close to the cylinder 06. However, it is also possible to provide in addition to the support element 24 a further rolling element 47 or 62 (Fig. 6 or 9), which will be discussed later, wherein the support element 24 can be arranged at a different position and need not be capable of being placed against the cylinder 06. For example, in this case the purpose of the support element 24 can be limited to generating a bending stress in the dressing 01.

The leading end 03 of the dressing 01 can also be brought toward the cylinder 06 in such a way that, after its contact with the surface area 07 of the cylinder 06, this end 03 faces away from the surface area 07 of the cylinder 06 at an acute angle gamma with an imagined second contact line T2 resting at a contact point 29 on the surface area 07 of the cylinder 06 (representation of the dressing 01 by a solid line in Fig. 4). However, the bending of the leading end 03 of the dressing 01 should only be strong enough so that the

suspension leg 13 formed there still rests securely against the surface area 07 of the cylinder 06. For aiding the secure resting of the suspension leg 13 against the surface area 07 of the cylinder 06 it is possible, for example, to place the support element 24 against the dressing 01, because of which the leading end 03 of the dressing 01 is maintained close to the surface area 07 of the cylinder 06.

In the course of a relative movement between the cylinder 06 and the dressing 01, preferably during the rotation of the cylinder 06 in its production direction P, but just as well during a suitable movement of the dressing 01, for example counter to the production direction P of the cylinder 06, the suspension leg 13 at the leading end 03 of the dressing 01 is hooked on the first edge 16 of the opening 09. A rolling element 24 placed against the cylinder 06 can here support the mounting of the dressing 01 on the cylinder 06 in that the rolling element 24 rolls the dressing 01 up on the cylinder 06. A suspension leg 14 is formed, for example, at the trailing end 04 of the dressing 01, wherein this suspension leg 14 is pressed into the opening 09 of the cylinder 06 in the course of rolling the dressing 01 up on the cylinder 06.

A device for executing the above mentioned method will now be explained by means of an example of a web-fed offset jobbing printing press with, for example, an upright rubber-against-rubber printing group in 4-cylinder construction with a horizontal guidance of a material 46 to be imprinted, preferably a paper web 46 (Fig. 5). Accordingly, in this example a first pair of cylinders 31, 32 is provided, which roll off on each other underneath the paper web 46 and consist of a forme cylinder 31 and a rubber blanket cylinder 32, and a second pair of cylinders 33, 34, which roll off on each other,

are arranged above the paper web 46 and consist of a forme cylinder 33 and a rubber blanket cylinder 34, wherein the paper web 46 is conducted between the two rubber blanket cylinders 32, 34, which are placed against each other. Preferably several, for example five or six, print positions at each side of the paper web 46 for differently colored ink are provided in the printing press, in that in the running direction of the paper web 46 several printing groups are arranged one behind the other. In particular, more forme cylinders 31, 33, or even several entire printing groups can be provided than are required for a production in four-color printing, so that at the forme cylinders 31, 33 not involved in the running production, or at one or several forme cylinders 31, 33 of the non-participating printing group it is possible to perform a change of at least one printing forme 36, 37. In the course of this the particular forme cylinder 31, 33 has been moved away from its rubber blanket cylinder 32, 34, i.e. the forme cylinder 31, 33 is not in contact with the associated rubber blanket cylinder, instead, both cylinders 31, 32, 33, 34 are separated from each other, for example by a pivot or travel movement, so far that the change of a printing forme 36, 37 at the forme cylinder 31, 33 is possible without any interference. Alternatively or additionally, the rubber blanket cylinder 32, 34, which works together with the forme cylinder 31, 33 with the printing forme 36, 37, can be moved away from the paper web 46, i.e. can be brought out of contact. An entire printing group can thus be placed into an operational state which is not involved in the running production in that the rubber blanket cylinders 32, 34, between which the paper web 46 is conducted, are placed away from each other in such a way that the paper web 46 can move between them without coming into contact with the

rubber blanket cylinders 32, 34.

In what follows it is assumed for the sake of simplicity and without restricting the invention, that at least the forme cylinders 31, 33 are identical in their size and in their structural type. Individual drive mechanisms are preferably assigned to the forme cylinders 31, 33 and the rubber blanket cylinders 32, 34. While changing a printing forme 36, 37, the number of revolutions of the respective forme cylinder 31, 33 is greatly reduced in comparison with the forme cylinders 31, 33 involved in the production, so that the respective forme cylinder 31, 33 only rotates very slowly. However, the number of revolutions of the respective forme cylinder 31, 33 can also be reduced to where it is stopped.

The forme cylinder 31 can be covered with a printing forme 36, and the forme cylinder 33 with a printing forme 37, wherein the printing formes 36, 37 have, for example, a length L corresponding to the circumference of the forme cylinders 31, 33, and a width B corresponding to the length of the respective barrels of the forme cylinders 31, 33. In this case the printing formes 36, 37 can have, for example, in relation to their width B four or six printed pages side-by-side and, in relation to their length L two printed pages one behind the other, therefore a total of eight or twelve printed pages. As already represented in Figs. 1 and 2, the printing formes 36, 37 have on their front ends in relation to their length L, beveled suspension legs 13, 14, by means of which the printing formes 36, 37 are fastened on the respective forme cylinder 31, 33, in that the suspension legs 13, 14 are inserted into a slit-shaped opening 09 cut into the surface areas of the forme cylinders 31, 33 and extending in the axial direction of the forme cylinders 31, 33 and are held there, if required, by means of a holding device preferably arranged in

a channel. The opening angle $\alpha 1$ between the beveled suspension leg 13 and the extended length L of the printing forme 36, 37 at the leading end 03 of the printing formes 36, 37 is preferably 45°. At the trailing end 04 of the printing formes 36, 37 the opening angle $\beta 1$ between the beveled suspension leg 14 and the extended length L of the printing formes 36, 37 is preferably 90°. The slit width S of the opening 09 cut into the forme cylinders 31, 33 preferably is 1 mm to 3 mm.

In a preferred embodiment of the printing press it is provided that a change of one or several printing formes 36, 37 on the forme cylinders 31, 33 can be made by remote control from a control console assigned to the printing press while the paper web 46 is running. In particular, a printing forme 36, 37 which has been assigned a definite color of printing ink, for example black, should be exchangeable without it being required to stop the printing process as a whole. To achieve this goal, for example a first printing forme magazine 38 arranged underneath the paper web 46 is provided for the forme cylinder 31, and for the forme cylinder 33 a second printing forme magazine 39 arranged above the paper web 46, wherein each printing forme magazine 38, 39 has at least one chute 41, 42 for receiving a used printing forme 36, 37 to be removed from the respective forme cylinder 31, 33, and at least one chute 43, 44 for receiving fresh printing formes 36, 37 to be mounted on the respective forme cylinder 31, 33. While the printing forme magazine 36, 39 assigned to the respective forme cylinder 31, 33 has been placed, for example by means of a pivot movement, against the respective forme cylinder 31, 33 for changing a printing forme 36, 37, the first forme cylinder 31 and the second forme cylinder 33, for example, are moved away from their respective rubber blanket

cylinders 32, 34, with which they are in an operative connection. However, alternatively or additionally to the forme cylinders 31, 33 the rubber blanket cylinders 32, 34 can be moved away from the paper web 46. In any case, during the change of one or several printing formes 36, 37, the respective forme cylinder 31, 33 is disengaged from the paper web 46, while in the printing group the other pair of cylinders 32, 34 can remain in production.

The chutes 41, 43, or 42, 44 for receiving a used or a fresh printing forme 36, 37 are each advantageously arranged parallel with each other in the printing forme magazines 38, 39, i.e. as a rule they are layered on top of each other. In this case a separating wall 84, for example, in the respective printing forme magazine 38, 39 can separate the chutes 41, 43 or 42, 44 from each other (Fig.5). For making possible satisfactory access to the chutes 41, 43, or 42, 44 even when the paper web 46 is running, for example for removing a used printing forme 36, 37 from the chutes 41, 42, or for making a fresh printing forme 36, 37 available in the chutes 43, 44, these chutes 41, 43, or 42, 44, are accessible, relating to the running direction of the paper web 46, from a side of the printing forme magazine 38, 39 extending parallel with the paper web 46. Preferably the printing forme magazines 38, 39 each extend over the width of the barrels of the forme cylinders 31, 33, but at least over the width B of the printing formes 36, 37, and are preferably capable of receiving a printing forme 36, 37 completely, i.e. over their lengths L. The chutes 41, 43, or 42, 44 are preferably located in a housing, wherein the housing has an opening o38, o39, which can be aligned parallel in respect to the barrel of the respective forme cylinder 31, 33, and through which a printing forme 36, 37 can be fed to the forme cylinder 31, 33,

or can be inserted from the latter into the chute 41, 43. For this purpose, the openings o38, o39 of the printing forme magazines 38, 39 are brought toward the forme cylinders 31, 33 at a clearly lesser distance a38, a39 in relation to the respective opening 09 in the forme cylinders 31, 33 than the length L of the printing formes 36, 37. Distances between 2% and maximally 50% of the length L of the printing formes 36, 37 are advantageous, in particular short distances a38, a39 up to 10% of the length L. It is advantageous to arrange at least the printing forme magazine 46 arranged above the paper web 46 to be movable, so that for example it can be moved or pivoted out of a position of rest, preferably located above the printing group, into a working position against the forme cylinder 33. By means of the movable arrangement of the printing forme magazine 38, 39 an improved accessibility of the printing group results, for example for performing work required there, for example maintenance work.

In its work position, a movably arranged printing forme magazine 38, 39 can be fixed in place in front of a forme cylinder 31, 33 at its distance a38, a39 and in its orientation by an arrestment 83 (Fig. 5). The arrestment 83 can be provided by a conical bolt 83, for example, which is fixed in place in reference to the forme cylinder 31, 33, for example, and enters into an opening in the housing of the printing forme magazine 38, 39 and centers a printing forme magazine 38, 39, which has been pivoted to the forme cylinder 31, 32, for example, in respect to the barrel of the forme cylinder 31, 33 by means of its openings o38, o39. Here, the conical bolt 83 has been preferably designed in such a way that in the course of its entry into the housing of the printing forme magazine 38, 39 no self-locking effect will occur, instead an incline is only used for position the

printing forme magazine 38, 39. In regard to the side register, it is advantageous to bring the forme cylinder 31, 32 into a predefined position in respect to the printing forme magazine 31, 33, for example to put it into a zero position in respect to the side register, before an exchange of a printing forme 36, 37 between the forme cylinder 31, 33 and the printing forme magazine 38, 39. It is also alternatively possible for setting the forme cylinder 31, 33 to bring the printing forme magazine 38, 39 into a predefined position laterally in respect to the forme cylinder 31, 33, so that the exchange of a printing forme 36, 37 between the printing forme magazine 38, 39 and the forme cylinder 31, 33 can take place correctly aimed and without lateral offset. For example, by means of this the printing forme 38, 39 can be brought into a predefined position laterally in relation to the forme cylinder 31, 33 in that the printing forme magazine 38, 39 is placed in a lateral position free of play, which can take place in that the printing forme magazine 38, 39 is introduced, preferably with at least a front area oriented toward the forme cylinder 31, 33, into a gap extending axially in respect to the forme cylinder 31, 33, wherein the gap has lateral boundaries which are stationary in respect to the frame of the printing press.

Without restricting the invention by this, in what follows it is assumed that the second printing forme magazine 39, which is arranged above the paper web 46 and can be placed against the forme cylinder 33 has two chutes 42, 44, which are arranged parallel on top of each other, namely a lower chute 42 for receiving printing forme 37 to be removed, and an upper chute 44 for making a fresh printing forme 37 available. Both chutes 42, 44 are only slightly spaced apart from each other in the printing forme magazine 39. It is preferably provided

that the printing forme 37 located in a chute 42 is spaced apart from a printing forme 37 located in the other chute 44 of the same printing forme magazine 39 by 30 to 40 mm, for example, preferably even less, because of which a very flat structural shape of the printing forme magazine 39 is achieved, which is very advantageous.

For removing a used printing forme 37, the printing forme magazine 39 is pivoted in front of the forme cylinder 33 and fixed in place there in such a way that at least the input area of the chute 42 for receiving the printing forme 37 is preferably directed tangentially toward the surface area of the forme cylinder 33. The forme cylinder 33 is rotated until an imagined tangential line T1, which rests on the slit-shaped opening 09 of the forme cylinder 33 is either aligned with the chute 42 for receiving the printing forme 37 to be removed, or at least extends parallel with this chute 42. As long as no means of the printing forme magazine 39 act in a pushing or pulling manner on the printing forme 37, the rotating forme cylinder 33 alone conveys the printing forme 37 into the printing forme cylinder 39. The entire process of the removal of a used printing forme 37 from the forme cylinder 33, the same as the mounting of a printing forme 37 freshly made available, can then be advantageously controlled by an electric control device, which preferably would be remotely controlled from a control console assigned to the printing press.

Preferably at the start of the process for the removal of a used printing forme 37 from the forme cylinder 33, or at least as soon as the trailing end 04 of the printing forme 37 has reached the opening 039 of the printing forme magazine 39, in particular if the rubber blanket cylinder 34 has been moved away from the forme cylinder 33, a rolling element 47 which,

for example, can consist of a plurality of rolls arranged side-by-side in the axial direction, is placed against the forme cylinder 33 at a distance from its opening 09 in the production direction P of the forme cylinder 33, so that the printing forme 37 is pushed against the forme cylinder 33 not far from its trailing end 04. The holding device in the forme cylinder 33 releases the trailing end 04 of the printing forme 37 and, because of the elasticity of the printing forme 37, this end 04 springs out of the opening 09. At this time the leading end 04 of the printing forme 37 preferably still rests in a positively connected manner against the end 16 of the opening 09, which lies in front in the production direction P.

Subsequently the forme cylinder 37 rotates counter to its production direction P until the trailing end 04 of the printing forme 37 has been introduced into the chute 42 for receiving the printing forme 37 to be removed and is snapped there in a positively connected manner onto a holding element 48, preferably by a contact over the entire surface of the beveled suspension leg 14 with the holding element 48, wherein the holding element 48 is embodied as a ratchet 48 (Fig. 6). Thus the holding element 48, i.e. the ratchet 48, is hooked on the beveled suspension leg 14 at the trailing end 04 of the printing forme 37. The holding element 48 is connected with a first conveying device 49, which is assigned to the chute 42 for receiving the printing forme 37 to be removed, preferably a, for example, linear drive mechanism assigned to the chute 42 for receiving the printing forme 37 to be removed, and pulls a hooked-on printing forme 37 into the chute 42.

In a preferred embodiment, the first conveying device 49 has a carriage 51, to which the holding element 48 is attached, for example pivotably by means of a joint (Fig. 6).

In the course of its rotation counter to its production direction P, the forme cylinder 33 pushes the trailing end 04 of the printing forme 37 into the chute 42 for receiving the printing forme 37 to be removed, wherein the suspension leg 04 beveled off on this end 04 is shoved against a stop 52 which, for example, is formed on the carriage 51 or attached there. The stop 52 is positioned in the chute 42 in such a way that, because of the trailing end 04 of the printing forme 37 being pushed against the stop 52, the leading end 03 of the printing forme 37 is pushed out of the opening 09 in the forme cylinder 33. Accordingly, the stop 52 is initially arranged at a distance from the opening 09 in the forme cylinder 33 so that a printing forme 37 to be removed from the forme cylinder 33 is pushed, shortly before its length L has been completely removed from the forme cylinder 33, with its suspension leg 14 at the trailing end 04 against the stop 52 and releases the suspension leg 13 at the leading end 03, preferably maintained at the front edge 16 of the opening 06 by a positive connection and not by a holding element 21, from the opening 09 by means of a transmitted pulse and without utilizing the elasticity of the leading end 03. Thus, the positively connected contact of the suspension leg 13 is terminated by a short jolt acting along the length L of the printing forme 03.

It can be provided that the holding element 48 at the trailing end 04 of the printing forme 37 is snapped together with the stop 52 because of the jolt. The holding element 48 can be embodied to be wedge-shaped, for example, and the tip of the wedge can be oriented toward the opening of the chute 42, so that in the course of the conveying movement the trailing end 04 of the printing forme 37 initially lifts the holding element 48 against a force, for example the force of the weight of the holding element 48, or a spring force which

is operatively connected with the holding element 48, until the beveled suspension leg 14 at the trailing end 04 extends behind the holding element 48 and grips it, after which the holding element 48 is again lowered into its initial position. It can be provided that the jolt of the trailing end 04 of the printing forme 37 against the stop 52 triggers a control signal, by means of which the carriage 51 of the first conveying device 49 is put into motion for conveying the printing forme 37 completely into the chute 42. The used printing forme 37 can thereafter be taken out of the side of the chute 42. Removal can be made easier in that an ejector 86 is preferably provided in the printing forme magazine 39, which laterally conveys the used printing forme 37 sufficiently far out of the chute 42 that the printing forme 37 can be grasped, so that reaching into the chute 42 is not necessary.

In the meantime the rolling element 47 placed against the forme cylinder 33 was moved away from the forme cylinder 33, preferably immediately prior to the leading end 03 of the printing forme 37 being expelled from the opening 09 in the forme cylinder 33. The rolling element 47 had been placed, non-positively connected, against the forme cylinder 33 in such a way that it aided the conveying of the printing forme 33 during the rotation of the forme cylinder 33. For example, the carriage 51 of the first conveying device 49 can be guided in laterally installed rails or ball boxes. It is advantageous to arrange a hingedly seated, preferably pivotable guide plate 53 near the forme cylinder 33 in front of the opening of the printing plate magazine 39, which can be oriented toward the forme cylinder 33 (Fig. 5), by means of which a trailing end 04 of the printing forme 37, which was released from the opening 09 in the forme cylinder 33, can be

conducted accurately guided to the chute 42 for receiving the printing forme 37 to be released. In particular, by means of the guide plate 53 it is possible to block an erroneous access of a printing plate 37 to be removed from the forme cylinder 33 to the chute 44, in which a fresh printing forme 37 can be held ready.

For the preparation of the mounting of a fresh printing forme 37 on the forme cylinder 33, the printing forme 37 to be mounted is placed into the upper chute 44 of the printing forme magazine 39, preferably from a side which is easily accessible during the printing process. Thereafter it is possible to put the mounting of the fresh printing forme 37 on the forme cylinder 33, which must be free for this printing forme 37, i.e. unoccupied, into motion by means of an electric control assigned to the printing press, preferably a control console. A second conveying device 54 assigned to the upper chute 44 for making available the fresh printing forme 37 is put into motion, preferably triggered by a control signal output from the control console, in order to push the fresh printing forme 37 forward out of the chute 44 of the printing forme magazine 39 in the direction of the forme cylinder 33 (Fig. 7). The second conveying device 54 can be a pneumatic linear drive mechanism, for example, which in particular is advantageously designed as an inclined lifting device for a printing forme 37, which is arranged hanging in the chute 44, as is the case in the printing forme magazine 39 arranged above the paper web 46, which means that the second conveying device 54 has a carriage 56, for example with a groove 57, into which the beveled suspension leg 14 on the trailing end 04 of the fresh printing forme 37 enters, preferably in the course of placing this printing forme 37 into the chute 44 of the printing forme magazine 39 wherein, in the course of

pushing the printing forme 37 out of the chute 44, the carriage 56 does not move parallel in respect to the printing forme 37, but instead is continuously farther removed from the printing forme 37, so that the beveled suspension leg 14 at the trailing end 04 of the fresh printing forme 37 is released from the groove 57 while the carriage 56 conveys the printing forme 37 out of the chute 44. Thus, the conveying direction of the second conveying device 54 can form an opening angle with the printing forme 37 of less than 30°, preferably of 15° to 20°. This selected opening angle is then fixed during the conveying and cannot be changed. Conveying the printing forme 37 can be aided by a stop 58 formed on the carriage 56 or attached there, wherein the stop 58 acts pushingly against the suspension leg 14 of the trailing end 04 of the fresh printing forme 37.

The fresh printing forme 37 is pushed with its leading end 03 against the forme cylinder 33, preferably tangentially, by the second conveying device 54 until the suspension leg beveled off at this leading end 03 rests on the surface area of the forme cylinder 33. While the printing forme 37 is moved out of the chute 44 in its mounting direction M, the printing forme 37 is conducted by a pusher 59, or at least by a lever 59, which is arranged laterally in the chute 44, is hingedly seated, and in particular is pivotable, against a one- or multi-part, undeformable lateral stop 61, which is arranged opposite the pusher 59 or the lever 59 and is fixed in place in the chute 44, so that the printing forme 37 is definitely aligned in its mounting direction M, and therefore also in the axial direction in respect to the forme cylinder 33 (Fig. 8). Several pushers 59 or levers 59 can also be provided in the chute 44, which can be advantageous in particular in connection with printing formes 37 of great

length L. The forme cylinder 33 is also advantageously put into a predefined position in respect to the side register in that it is put into a zero position in respect to the side register, before the fresh printing forme 37 is applied to it. The pivot axis of the levers 59 is preferably arranged vertically in respect to the support surface 02 of the printing forme 37. Preferably the at least one lever 59 acts intermittently laterally on the printing forme 37, wherein the placing into contact of the lever 59 takes place, for example, by an actuating means, in particular a pneumatically operated actuating means, against the force of a spring. In the course of being put into contact, the lever 59 is pulsatingly deflected, so that it provides a push only over a short period of time, but so that the printing forme 37 can otherwise be moved unhindered in its mounting direction M, for example. Since the lever 59 only acts for a short time on the printing forme 37, the printing forme 37 can be again conveyed into the chute 44 if needed, without the lever 59 hindering a movement of the printing forme 37 counter to its mounting direction M. The pusher 59 or lever 59 is preferably activated for the purpose of aligning the printing forme 37 at the time the printing forme 37 is conveyed out of the chute 44. If a further stop 63 is provided in the mounting direction M of the printing forme 37, the lever 59 can then press against the side of the printing forme 37 and align it in the axial direction in relation to the forme cylinder 33 while the printing forme 37 rests against the further stop 63. By means of a lever 59, which is laterally deflected by pneumatically actuated means against a printing forme 37 of a width B, which is variable within defined tolerance limits, a force of identical size regardless of the actual width measurement of the printing forme 37 is always placed against the printing

forme 37.

Even before the leading end 03 of the printing forme 37 reaches the forme cylinder 33, a rolling element 62 is placed against the forme cylinder 33, and a stop 63 is conducted close to the forme cylinder 33 (Fig. 8). The rolling element 62 can consist of a plurality of rolls arranged side-by-side in the axial direction. The stop 63, which can also consist of a plurality of rolls arranged side-by-side in the axial direction, is arranged in the mounting direction M of the printing forme 37 in front of the rolling element 62 or at the side of the rolling element 62. The stop 63 has an inclined face 64 facing the forme cylinder 33, whose imaginary straight-line extension intersects the surface area at an intersection point C. An imagined third tangent line T3 rests on the surface area of the forme cylinder 33 at the intersection point C, with which the inclined face 64, or its imaginary extension, forms an acute angle delta, which is open in the direction toward the printing forme 37 conducted to the forme cylinder 33. The stop 63 can be designed as a wedge, for example, which is fixedly connected with a support for the rolling element 62. The leading end 03 of the fresh printing forme 37 brought against the forme cylinder 33 comes into contact with the inclined face 64 of the stop 63, by means of which the printing forme 37 is aligned in respect to the forme cylinder 33. The previously described alignment of the printing forme 37 by means of the levers 59 can also take place only at the end of conveying the printing forme 37 out of the chute 44 if the leading end 03 of the printing forme 37 already rests against the stop 63.

The leading end 03 of the fresh printing forme 37 brought against the forme cylinder 33 is fed to the surface area of the forme cylinder 33 in such a way that the

suspension leg 13, beveled off at the leading end 03 is pressed against the surface area of the forme cylinder 33 and rests on it. The opening angle α1 between the beveled suspension leg 13 and the extended length L of the printing forme 37 can be slightly reduced because of the pressure exerted by the stop 63 on the leading end 03 of the printing forme 37 in the direction of the forme cylinder 33. Since the suspension leg 13 beveled at an opening angle α1 of preferably 45° at the leading end 03 has a length l13 in the range between 4 mm to 11 mm, for example, in particular 4 mm to 8 mm, preferably 6 mm, the leading end 03 of the printing forme 37 is located close to the surface area of the forme cylinder 33, or close to a fourth tangential line T4 resting on the forme cylinder 33 at the contact point of the suspension leg 13. The distance a37 is 2.5 mm to 6 mm, for example. The rolling element 62, which has been placed together with the stop 62 against the forme cylinder 33, has a radius r62, which has been selected to be slightly larger than the measurement of the distance a37. For example, the radius r26 lies within the range of 5 mm to 15 mm, preferably at 10 mm.

For mounting the printing forme 37, the forme cylinder 33 is rotated until the suspension leg 13 beveled off on the leading end 03 of the printing forme 37 can be placed on the surface area of the forme cylinder 33 at a distance a09 in the production direction P of the forme cylinder 03 behind the rear edge 16 of the opening 09, wherein the distance a09 is less than an arched segment of the length of a quarter, in particular one-eighth, of the circumference of the cylinder 06. The distance a09 is preferably clearly less than the length of the circumference of the rolling element 62. A preferred embodiment provides that the suspension leg 13 beveled off at the leading end 03 of the printing forme 37 is

placed at a distance a09 of between 5 mm to 10 mm behind the opening 09.

While the forme cylinder 33 continues to rotate in its production direction P, the suspension leg 13 beveled off at the leading end 03 of the printing forme 37 is hooked in the opening 09 of the forme cylinder 33, aided by a force FR directed radially in respect to the forme cylinder 33. The force FR directed radially in respect to the forme cylinder 33 is correlated with the pressure with which the leading end 03 of the printing forme 37 is pressed against the forme cylinder 33. The pressure is the result of a contact pressure exerted by the stop 63 and can be increased by the inherent weight FG of the printing forme 37, or in that the leading end 03 of the printing forme 37 is elastically prestressed with an effective direction against the forme cylinder 33.

Different from the above described exemplary embodiment of the printing forme magazine 39 arranged above the paper web 46, in the printing forme magazine 38 arranged underneath the paper web 46, the printing forme 36 in the chute 43 for making the fresh printing forme 36 available rests partially, preferably between 30% and 50% of its length L on a support 66 (Fig. 10), wherein the printing forme 36 is maintained by its inherent weight, preferably frictionally connected, on the support 66. Because of this it is not necessary to employ external energy for holding the printing forme 36 on its support 66, for example by a suction device charged with a vacuum, which fixes the printing forme 36 in place on the support 66. The support 66 can be moved by means of a third conveying device 67, which can be designed as a pneumatic linear drive mechanism and with whose aid the fresh printing forme 36 can be pushed with its leading end 03 against the force of gravity upward, preferably tangentially in respect to

the forme cylinder 31. To this end, the suspension leg 14 at the trailing end 04 of the printing forme 36 preferably again rests against a stop 58, which can be applied to the support 66 or formed on it. If the printing forme 36 is conveyed against the force of gravity against the forme cylinder 31, a means corresponding to the stop 63 can be omitted. Thus, the third conveying device 67 is, the same as the second conveying device 54, preferably designed as a translatory conveying device, which performs a displacement path.

In the printing forme magazine 39 arranged above the paper web 46, the suspension legs 13, 14 of the printing forme 37 point upward, and the printing forme 37 can be arranged hangingly suspended in the chute 44, in that the suspension leg 14 attached to the trailing end 04 of the printing forme 37 is held on the carriage 56 of the second conveying device 54 (Fig. 7), while in the printing forme magazine 38 arranged underneath the paper web 46 the suspension legs 13, 14 of the printing forme 36 point downward, i.e. toward the support 65 for the printing forme 36 (Fig. 10).

Corresponding to the exemplary embodiment described for the printing forme magazine 39 arranged above the paper web 46, a fourth conveying device 68 with a hingedly, in particular pivotably seated holding element 69, in particular a ratchet, can be provided in the printing forme magazine 38 arranged underneath the paper web 46 in the chute 41 for receiving a printing forme 36 to be removed from the forme cylinder 31, so that the holding element 69 at the suspension leg 14 of the trailing end 04 of a used printing forme 39, which is wound off by means of the rotation of the forme cylinder 31 and is pushed into the chute 41, is hooked and pulls it preferably completely into the chute 41 because of the movement of the fourth conveying device 68 (Fig. 11).

It is advantageous to provide at least one friction body 71, 72 in each of both printing forme magazines 38, 39 in the chutes 43, 44 for making available a fresh printing forme 36, 37, which, in particular during the mounting of the fresh printing formes 36, 37 on the respective cylinders 31, 33, then presses the fresh printing forme 36, 37 against a corresponding abutment 73, 74 (Fig. 12) at least when the suspension leg 13 on the leading end 03 of the printing forme 36, 37 has been hooked in the front edge 16 of the opening 09 in the forme cylinder 31, 33. The friction bodies 71, 72 and their abutment 73, 74 are preferably arranged in the chutes 43, 44 vertically in respect to the conveying direction of the printing formes 36 37 so that, because of their contact pressure exerted on the printing formes 36, 37, they hold the respective printing forme 36, 37 in a defined position as if with cheeks, while the respective printing forme 36, 37 is pulled by the rotating forme cylinder 31, 33 onto the respective forme cylinder 31, 33. Because the fresh printing forme 36, 37 is pulled onto the respective forme cylinder 31, 33 against the contact pressure exerted by the friction bodies 71, 72 and abutments 73, 74, the printing forme 36, 37 lies more tautly on the forme cylinder 31, 33. By means of this it is also assured that the printing forme 36, 37 rests free of play against the front edge 16 of the opening 09 of the forme cylinder 31, 33. Incidentally, the friction bodies 71, 72 can also be used for applying a bending stress to the printing forme 36, 37 in the manner previously described in connection with the support element 43. Thus, the friction bodies 71, 72 can take on the function of a brake or a holding means and can be of importance in particular in connection with chutes 43, 44 which have been placed inclined in respect to the force of gravity against a forme cylinder 31, 33.

In a preferred embodiment, the friction body 71, 72 is arranged in the chutes 43, 44 in such a way that the friction body 71, 72 acts against the side of the printing forme 36, 37, which is provided with a print image. In order to prevent damage to the printing forme 36, 37 and its print image by the contact pressure which can be exerted by the friction body 71, 72, the friction bodies 71, 72 have a friction surface 76, 77, which is preferably smooth and of lesser hardness than the surface of the printing formes 36, 37 facing the friction bodies 71, 72. The friction bodies 71, 72 preferably are made of a reversibly deformable hollow body, for example a tube which can be filled with a pressure medium, for example compressed air, wherein the tube is made of an elastomeric material, for example rubber. The abutments 73, 74 can be embodied, for example, as one or several rails made of plastic with a surface on which the bodies can preferably slide. However, the friction bodies 71, 72 can also be arranged on a conveying device, which conveys the printing formes 36, 37 in the chutes 43, 44, for example on the carriage-like support 66, and can hold at least one of the printing formes 36, 37 when needed. Thus, the friction bodies 71, 72 can also be placed against a printing forme 36, 37 which is conveyed into the chute 43, 44.

In the course of being charged with a pressure medium, the friction bodies 71, 72, preferably embodied as hollow bodies, increase their volume and exert a surface pressure on a printing forme 36, 37 resting against them, wherein the printing forme 36, 37 is supported on the back by one of the abutments 73, 74, preferably made of plastic. The intensity of the surface pressure is preferably controllable by the pressure medium. Since the elastomeric material of the friction bodies 71, 72, as well as the plastic material of the

abutments 73, 74, have a lesser hardness than the printing formes 36, 37 made of a metallic material, in particular of an aluminum alloy, damage of the printing formes 36, 37 when the printing formes 36, 37 are pulled under the existing surface pressure out of the chute 43, 44 need not be feared.

The friction bodies 71, 72 and their abutments 73, 74 are arranged in the chutes 43, 44 preferably near the respective openings of the chutes 43, 44, i.e. close to the place where a fresh printing forme 36, 37, which is made available in the chutes 43, 44 for mounting on the forme cylinder 31, 33, leaves the respective printing forme magazine 38, 39. The friction bodies 71, 72 and their abutments 73, 74 are arranged in the chutes 43, 44, for example, parallel in respect to the width B of the printing forme 36, 37. The friction bodies 71, 72, preferably embodied as hollow bodies, can be seated in a strip 78 with a U-shaped profile, for example, wherein the U-shaped profile is preferably open at the side facing the printing forme 36, 37. The U-shaped profile laterally enclosing the hollow body lends stability to the hollow body and directs its increase in volume caused by its being charged with compressed air purposely against the printing forme 36, 37.

One embodiment of the friction bodies 71, 72 consisting of a hollow body provides (Fig. 13) for the hollow body to be conducted over the width B of the printing forme 36, 37 in a channel 79 extending over the width B of the printing forme 36, 37, and for the channel 79 having openings 81, 82, which are spaced apart from each other and are oriented toward the printing forme 36, 37, for example two openings 81, 82 in particular, through which the hollow body can exert a surface pressure on the printing formes 36, 37 when charged with a pressure medium. If the friction bodies 71, 72 are embodied

as hollow bodies extending preferably over the entire width B of the printing forme 36, 37 it is assured that, when the hollow bodies are charged with a pressure medium, a uniform surface pressure preferably over the entire width B of the printing forme 36, 37 results.

The surface pressure is released by exhausting, in particular emptying the friction bodies 71, 72 embodied as hollow bodies by suction, because of which the volume of the hollow bodies is reduced before the suspension leg 14 arranged at the trailing end 04 of the printing forme 36, 37 passes the place of surface pressure in the course of moving the printing forme 36, 37 out of the chute 43, 44. Therefore the surface pressure only acts for a short time.

Furthermore, further guide elements for a dependable, in particular slightly braked transport and a support of the printing forme 36, 37 free of play to a large extent can be provided in the chutes 41 to 44 on those sides which face the surface of the printing forme 36, 37. Brush arrangements are particularly suitable for this, which do no damage the sensitive surfaces of the printing formes 36, 37.

It is also advantageous for as simple and unhindered mobility as possible of the printing forme magazines 38, 39 to design the printing forme magazines 38, 39 in such a way that only a single connecting element is provided on each printing forme magazine 38, 39, which combines all required connecting lines in a bundle for providing the printing forme magazine 38, 39 with electrical and other energy, depending on the units installed in them, as well as for performing the exchange of control signals. Alternatively to the described preferably pneumatic drive mechanisms of the conveying devices 49, 54, 67 and 68, as well as other units, electric drive mechanisms and an electric control can also be provided for

these devices and units.

List of Reference Symbols

01	Dressing, printing forme
02	Support surface (01)
03	End, leading (01)
04	End, trailing (01)
05	-
06	Cylinder
07	Surface area (06)
08	Channel
09	Opening (06)
10	-
11	Bending edge (13)
12	Bending edge (14)
13	Suspension leg
14	Suspension leg
15	-
16	Edge, front, first (09)
17	Edge, rear, second (09)
18	Wall
19	Wall
20	-
21	Holding means
22	Spring element
23	Actuating means
24	Support element, rolling element
25	-
26	Edge
27	Contact line, contact point
28	Positional fixation
29	Contact point

30	-
31	Cylinder, forme cylinder, first
32	Cylinder, rubber blanket cylinder, first
33	Cylinder, forme cylinder, second
34	Cylinder, rubber blanket cylinder, second
35	-
36	Printing forme
37	Printing forme
38	Printing forme magazine
39	Printing forme magazine
40	-
41	Chute
42	Chute
43	Chute
44	Chute to
45	-
46	Material to be imprinted, paper web
47	Rolling element
48	Holding element, ratchet
49	Conveying device, first
50	-
51	Carriage
52	Stop
53	Guide plate
54	Conveying device, second
55	-
56	Carriage
57	Groove
58	Slider, lever
60	-
61	Stop
62	Rolling element

63	Stop
64	Inclination of the stop (63)
65	-
66	Support
67	Conveying device, third
68	Conveying device, fourth
69	Holding element, ratchet
70	-
71	Friction body
72	Friction body
73	Abutment
74	Abutment
75	-
76	Friction surface (71)
77	Friction surface (72)
78	Strip
79	Channel
80	-
81	Opening (79)
82	Opening (79)
83	Arrestment, conical bolt
84	Separating wall
85	-
86	Ejector
FR	Radial force
FG	Force of weight
MR	Restoring moment
B	Width
C	Intersection point
D	Thickness of the material

L	Length
M	Mounting direction
P	Production direction
S	Slit width
T1	Tangent line, first
T2	Tangent line, second
T3	Tangent line, third
T4	Tangent line, fourth
l13	Length
l14	Length
a09	Distance
a37	Distance
a38	Distance
a39	Distance
o38	Opening
o39	Opening
r62	Radius
α1	Opening angle
α2	Opening angle
β1	Opening angle
β2	Opening angle
gamma	Opening angle
delta	Opening angle